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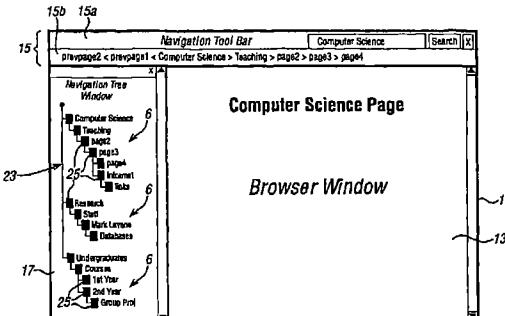
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(54) Title: A USER INTERFACE FOR NAVIGATION THROUGH A NETWORK



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(57) Abstract: A user interface (3) for facilitating navigation through a Web site (25), or any other hypertext network, given a user query (4). The user interface (3) requests pages from the Web site in order for them to be displayed on the browser window (13). The user interface (3) includes two main mechanisms: the navigation tool bar (15) and the navigation tree window (17). The navigation tool bar (15) comprises a sequence of URLs (25). The first two URLs displayed on the navigation tool bar (15) are the last two URLs of the pages that the user browsed, thus providing a history mechanism. The next URL on the navigation tool bar (15) is the current URL identifying the page the user is currently browsing. The URLs that follow the current URL on the navigation tool bar are the consecutive URLs of the most preferred trail (6) from the current URL. All URLs are clickable and cause the navigation tool bar (15) to be updated accordingly. The navigation tree window (17) displays the preferred trails (6) given the user query (4), organised in the form of a tree structure (23) with the trails (6) being ranked from the most preferred, according to their score. The user interacting with the navigation tree window (17) can select any URL on one of the preferred trails (6) causing it to be the current URL. The navigation tool bar (15), the navigation tree window (17) and the browser window (13) are all synchronised according to the current URL. The mechanisms of the user interface (3) provide the user with guidance and context throughout a navigation session, given the input query (4). The user interface (3) can be embodied in a Web site as a navigation mechanism complementing or replacing a Web site search engine.

A USER INTERFACE FOR NAVIGATION THROUGH A NETWORK**1. Technical Field**

The present invention relates to the field of browsing and navigation for the 5 purpose of finding preferred trails between pages in a network, and more particularly to a user interface and associated method which provides a tool for assessing trails between pages of a Web site in the World-Wide-Web or in any other hypertext system to assist in finding relevant information.

10 A possible algorithm for computing given a user query a collection of preferred trails, which may provide an input set of trails to a user interface according to the present invention, is disclosed in the applicant's earlier U.K. patent application 9930070.9, the content of which is considered to be incorporated herein by reference.

15

2. Background

The environment in which the present invention may operate in is a Web 20 site or the like in the World-Wide-Web (known as the Web) or any other hypertext system. The Web can be viewed as a hypertext database containing nodes, which are the Web pages, and links between these nodes defining its topology. A Web site can be viewed as a well-defined portion of the Web which in itself is a hypertext database. Each Web page has a unique identifier describing where the 25 page resides and how to retrieve it. The mechanism used is that of a *Unified Resource Locator*, or simply URL, which specifies the unique path for locating the Web page. In the following we use the term clicking on a URL to mean clicking on a textual summary of a URL or a hypertext link to a URL.

30 The process of *navigation* (colloquially known as "surfing") is that of following links by clicking on URLs and inspecting (or browsing) the contents of Web pages visited during this process. A navigation session results in the user visiting a sequence of Web pages, which is called a *trail*. A trail is represented by

the sequence of URLs associated with its pages. For example, a user's trail may be the sequence of URLs:

$U_1, U_2, U_3, U_2, U_1, U_4.$

5 During the navigation process users may become "lost in hyperspace", meaning that they become disoriented in terms of what to do next and how to return to a previously browsed Web page. In this situation readers may lose the context in which they are browsing and need assistance in finding their way. This problem is known as the *navigation problem*.

10

We assume that the context of a navigation session is a query, which normally would be a set of keywords. The query can be viewed as the goal of the navigation session in the sense that the user would like to follow a trail which maximises the relevance of the trail to the query. The relevance of a trail to the 15 query is realised by its score, which is a function of the scores of the individual Web pages of the trail with respect to the query. The score of a page with respect to a query indicates how closely the page contents match the query, i.e. how relevant the Web page is to the query. The scoring of individual Web pages with respect to a query is realised by information retrieval techniques. A detailed 20 description of various trail scoring methods can be found in the above-mentioned earlier U.K. patent application No. 9930070.9.

3. Summary of the Invention

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As stated above, there exists a navigation problem when surfing due to a user becoming lost in hyperspace. The present invention aims to overcome this problem, and to assist users in understanding where they are in the Web or other network, for example, and how best to return to a previously browsed web page or 30 access another page of interest in a preferred trail.

In accordance with the foregoing, the present invention provides a user interface, a system incorporating the user interface and an associated method for conducting a navigation session.

5 More particularly, the present invention provides a user interface for assisting navigation through a network of related sites, wherein the user interface displays together a sequence of consecutive sites in a trail. By displaying perhaps five or more consecutive sites in a trail, a user can readily see in which direction he/she is navigating (or surfing).

10

The plurality or sequence of consecutive sites in a trail is preferably displayed in a line, possibly along the top of a display in the form of a navigation tool bar. The tool bar may also include a search box for inputting a user query.

15 According to another aspect of the present invention, there is provided a user interface for assisting navigation through a network of related sites, wherein the interface displays together a plurality of trails of sites. By including a plurality of trails of sites, which are preferably the best trails found using a navigation engine based on a user query, a user can readily determine where he/she is in a
20 network or Web site, and how best to locate relevant information within the site.

If a plurality of trails of sites are displayed, they are preferably displayed as a navigation tree showing how the various trails interrelate in the Web site. More particularly, the navigation tree is preferably displayed in a navigation tree window
25 of a browser display.

More preferably, both a navigation tool bar and a navigation tree window are displayed together. Further, both the navigation tool bar and the navigation tree window are preferably updated simultaneously, even when a user selects a
30 site displayed in a browser window, thereby keeping a user correctly and continuously informed.

Preferably the user interface displays the name of the current site being viewed together with at least one subsequent site in a trail. More preferably, the current site is displayed together with at least one preceding site in a trail. More preferably, at least two preceding sites in a trail are displayed, together with at 5 least three subsequent sites. Such an arrangement assists a user in determining where they are in a trail, and more generally where they are within the Web site.

The present invention further provides a navigation system comprising a user interface as herein described. The system preferably also includes a 10 navigation engine for providing best trails based on a user query. These best trails can be displayed in the navigation tree window, so that a user can readily determine where best to search for relevant information within the Web site. The facility of allowing direct access to a site by simply clicking on the site in the navigation tree window or on the navigation tool bar can save considerable time 15 for the user in locating relevant information. This is clearly beneficial.

The system preferably further comprises an output display including a navigation tool bar and a navigation tree window. Furthermore, the navigation tool bar and/or the navigation tree window may have the facility of being hidden from 20 view when a user wishes.

According to the present invention, there is also provided a method of navigating through a network of related sites, comprising displaying a trail of consecutive sites, including subsequent sites in a trail, and clicking on any 25 displayed site to travel directly to that site. As mentioned above, by enabling a user to access a site further down a navigation tree, for example, significant savings in time can be achieved in locating relevant information. More efficient searching is thereby effected.

4. Description of Specific Embodiment of User Interface

A specific embodiment of the present invention is now described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 shows a navigation system architecture according to the present invention; and

Figure 2 shows a user interface display incorporating a navigation tool bar, a navigation tree window and a browser window.

10

As discussed above, the present invention provides a user interface, a navigation system and an associated method for conducting a navigation session. The architecture of the navigation system 1 is shown in Figure 1. The *user interface* 3 is a software system which obtains the preferred trails for navigation, given a user query 4, from a *navigation engine* 5. (See U.K. patent application 9930070.9 for a possible algorithm that the navigation engine 5 could invoke for computing preferred trails 6 given a user query 4.) The user interface 3 executes on top of a conventional browser 7 such as Microsoft Internet Explorer or Netscape Navigator. The navigation engine 5 interacts with a *Web case* 9, which is a database for storing the details of the pages of the Web site in pre-processed form. The user interface 3 requests pages from the *Web site* 11 (or more generally, the network) in order for them to be displayed on a *browser window* 13 according to the method described hereinafter.

25 The user interface 3 provides a method for navigating through a web site 11, or more generally a network, primarily using two mechanisms: a *navigation tool bar* 15 and a *navigation tree window* 17, both of which are shown in Figure 2, which is a schematic drawing of a frame 18 displaying the user interface 3. The navigation tool bar 15 is situated in the top two lines of a display frame 18 and the 30 navigation tree window 17 is situated in the left hand side of the frame 18. (Note that the Figure represents only one particular embodiment of the user interface 3, and does not preclude other embodiments which fall within the scope of the present invention.)

4.1 The Navigation Tool Bar

The navigation tool bar 15 contains two lines. The top line 15a provides a search box where the user inputs his/her query. The line 15b below it provides the key feature of the navigation tool bar 15. It comprises of a sequence of URLs. The first two URLs to the left of the tool bar 15 provide a history mechanism. In particular, they are the last two URLs of the pages that the user browsed. More specifically, the URL on the far left is the second to last URL visited and the URL next to it is the last URL visited. The number of URLs listed via the history mechanism will be zero at the start of the session, and one after browsing a single page and visiting a further page. The history depth of two could be changed if required. The third URL in the sequence displayed on the navigation tool bar is the URL of the page currently displayed on the browser window 13; let us call this URL the *current URL*. Initially, the current URL is the first URL of the most preferred trail, i.e. the trail having the highest score from the set of trails 6 returned by the navigation engine 5, given the user query 4. The URLs following the current URL displayed on the navigation bar are the consecutive URLs of the most preferred trail 6. That is, the URL following the current URL is the second URL on the most preferred trail 6, the URL following that is the third URL on the most preferred trail 6, and so on.

Each of these URLs is clickable causing the user interface 3 to request 19 the page identified by the URL and to display 21 the page on the browser window 13 for the user to interact with. When a page is selected by clicking on a URL this URL becomes the current URL, the history mechanism is updated accordingly and the most preferred trail starting from the current URL is displayed to the right of the current URL. At each stage of the navigation session, when the user selects a new URL the navigation tool bar 15 updates the history mechanism and the most preferred trail 6 starting from the current URL. This facilitates user navigation by guiding the user to the information they require.

4.2 The Navigation Tree Window

The navigation tree window 17, on the left hand side of the frame 18, displays the preferred trails 6 given the user query 4. The trails 6 are organised in 5 a tree structure 23 with the trails being ranked from the most preferred, according to their score. All the icons 25 within the tree 23 represent URLs, and these URLs are clickable causing the user interface 3 to request 19 the page identified by the URL and to display 21 the page on the browser window 13 for the user to interact with. When a page is selected by clicking on a URL 25, this URL becomes the 10 current URL and the navigation tool bar 15 is updated as detailed in Subsection 4.1 above. As a side effect, the current URL is highlighted in the navigation tree window 17. This behaviour of the user interface 3 provides synchronisation between clicks on URLs in the navigation tree window 17 and the navigation tool bar 15, and facilitates user orientation during a navigation session. The tree 23 15 displayed in the window 17 can also be manipulated by allowing trails 6 and subtrees to be opened and closed. The user also has the facility to close the navigation tree window 17 and reopen it when desired.

4.3 The Browser Window

20 The browser window 13 displays pages identified by URLs and is also under control of the user interface 3 which requests and displays pages according to the user's clicks. When a URL in the browser window 13 is selected by a user's click on a link, this URL becomes the current URL and the navigation tool bar 15 is 25 updated as detailed in Subsection 4.1. In addition, the current URL is highlighted in the navigation tree window 17 as detailed in Subsection 4.2. Thus the navigation tool bar 15, the navigation tree window 17 and the browser window 13 are kept synchronised by the user interface 3. This helps the user maintain the context of the search during a navigation session.

4.4 Pop Up Windows

When the user puts the cursor over any URL 25 displayed in the user interface 3, a pop up window will appear which summarises information pertaining 5 to the URL 25. Such information may include but is not limited to: the URL itself, the title of the page identified by the URL, a textual summary of the page identified by the URL, the type of page, e.g. text or graphics, the rank of the most preferred trail 6 this URL is on, and the score of the page identified by the URL.

10

5. A Method for Navigation through a Network

The user interface 3 described above in Section 4 provides a novel method 15 of user navigation through a Web site, given a user query 4. At all times the user interacts with the most preferred trail 6 from the current URL 25, with the aid of the navigation tool bar 15. The navigation tool bar 15 also includes a history mechanism allowing the user to backtrack to previously browsed pages. The navigation tree window 17 provides visualisation of the portion of the Web site 20 relevant to the input query 4 as returned from the navigation engine 5. The user interface 3 thus tackles the navigation problem by providing the user with continuous guidance and context during a navigation session. This method extends the current method of navigation where the user interacts only with a single page of information and its embedded links. It provides semi-automated 25 navigation through a Web site, thereby helping to overcome the navigation problem.

6. Industrial Application

30

The user interface can be embodied in a Web site as a navigation mechanism complementing or replacing current Web site search practise, which current practise displays a linear list of URLs as a result of a given a user query.

It will of course be understood that the present invention is described above purely by way of example, and that modifications of detail can be made within the scope of the invention.

CLAIMS

1. A user interface for assisting navigation through a network of related sites, wherein the interface displays together a plurality of consecutive sites in a trail.
5
2. A user interface as claimed in claim 1, wherein the consecutive sites are displayed in a line.
3. A user interface as claimed in claim 1 or claim 2, wherein the consecutive sites define a best trail associated with a query.
10
4. A user interface for assisting navigation through a network of related sites, wherein the interface displays together a plurality of trails of sites.
- 15 5. A user interface as claimed in claim 4, wherein the plurality of trails of sites are displayed in the form of a tree.
6. A user interface incorporating the features of any of claims 1 to 3 together with the features of claims 4 or 5.
20
7. A user interface as claimed in claim 6, wherein the plurality of consecutive sites in a trail are displayed in a navigation tool bar with a search box for inputting a user query.
- 25 8. A user interface as claimed in claim 6 or claim 7, wherein the plurality of trails of sites forming a tree are displayed in a navigation tree window.
9. A user interface as claimed in claim 8, when dependent on claim 7, wherein the navigation tool bar and the navigation tree window are updated
30 simultaneously.
10. A user interface as claimed in claim 8 or claim 9, wherein a user can select any site displayed on the navigation tool bar or in the navigation tree window.

11. A user interface as claimed in any one of claims 7 to 10, wherein when a user selects a site displayed in a browser window, the navigation tool bar is updated to reflect this selection.

5

12. A user interface as claimed in any preceding claim, wherein a current site is displayed together with at least one subsequent site in a trail.

13. A user interface as claimed in any preceding claim, wherein a current site is
10 displayed together with at least one preceding site in a trail.

14. A user interface substantially as hereinbefore described with reference to
and as shown in Figure 2 of the accompanying drawings.

15 15. A computer readable medium storing a user interface as claimed in any
preceding claim.

16. A navigation system comprising a user interface as claimed in any
preceding claim.

20

17. A navigation system as claimed in claim 16, further comprising a navigation
engine for providing best trails based on a user query.

18. A navigation system as claimed in claim 16 or claim 17, further comprising
25 an output display including a navigation tool bar and a navigation tree window.

19. A navigation system as claimed in claim 18, wherein the navigation tree
window can be hidden from view.

30 20. A navigation system substantially as hereinbefore described with reference
to and as shown in the accompanying drawings.

21. A method of navigating through a network of related sites, comprising displaying a trail of consecutive sites, including subsequent sites in a trail, and clicking on any displayed site to travel directly to that site.

5 22. A method as claimed in claim 21, wherein the step of displaying a trail of consecutive sites includes displaying at least one site which precedes the current site.

23. A method as claimed in claim 21 or claim 22, wherein a plurality of trails are

10 displayed as a navigation tree.

24. A method of navigating through a network of related sites substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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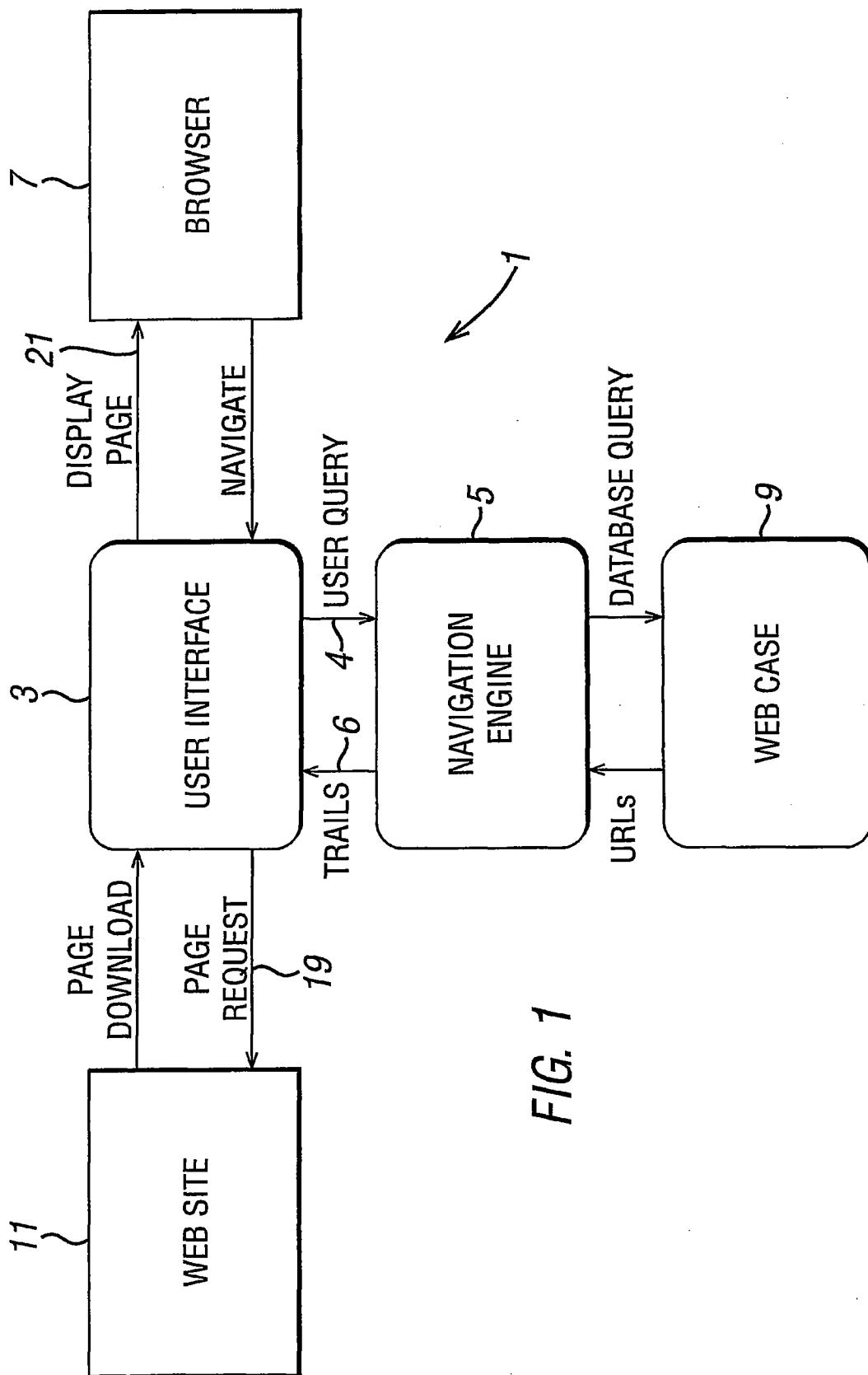


FIG. 2

